PS1 PU-18 DOUBLE (2MB) VRAM Mod; By Tunertom.

Guide Rev.B

So… you find yourself wanting twice the VRAM on your PS1 console? Perhaps you are a homebrew developer or maybe you just want a weekend project to work on for the fun of it…

This will NOT improve performance on retail release games, only game mods or homebrew can take advantage of this mod.

You are going to need:

- 1x K4G163222A-QC70 or K4G163222A-PC70 VRAM chip.
  (or any SGRAM chip that matches the specs exactly)

- 1x 74LVCG08 Logic gate.
  (or similar logic gate with the same function if you prefer a larger package size)

- Silicone 30awg wire that is 0.8mm outer diameter or smaller.
- 0.8mm PCB drill bit.
- Surface mount soldering skills and soldering supplies.
- Patience.

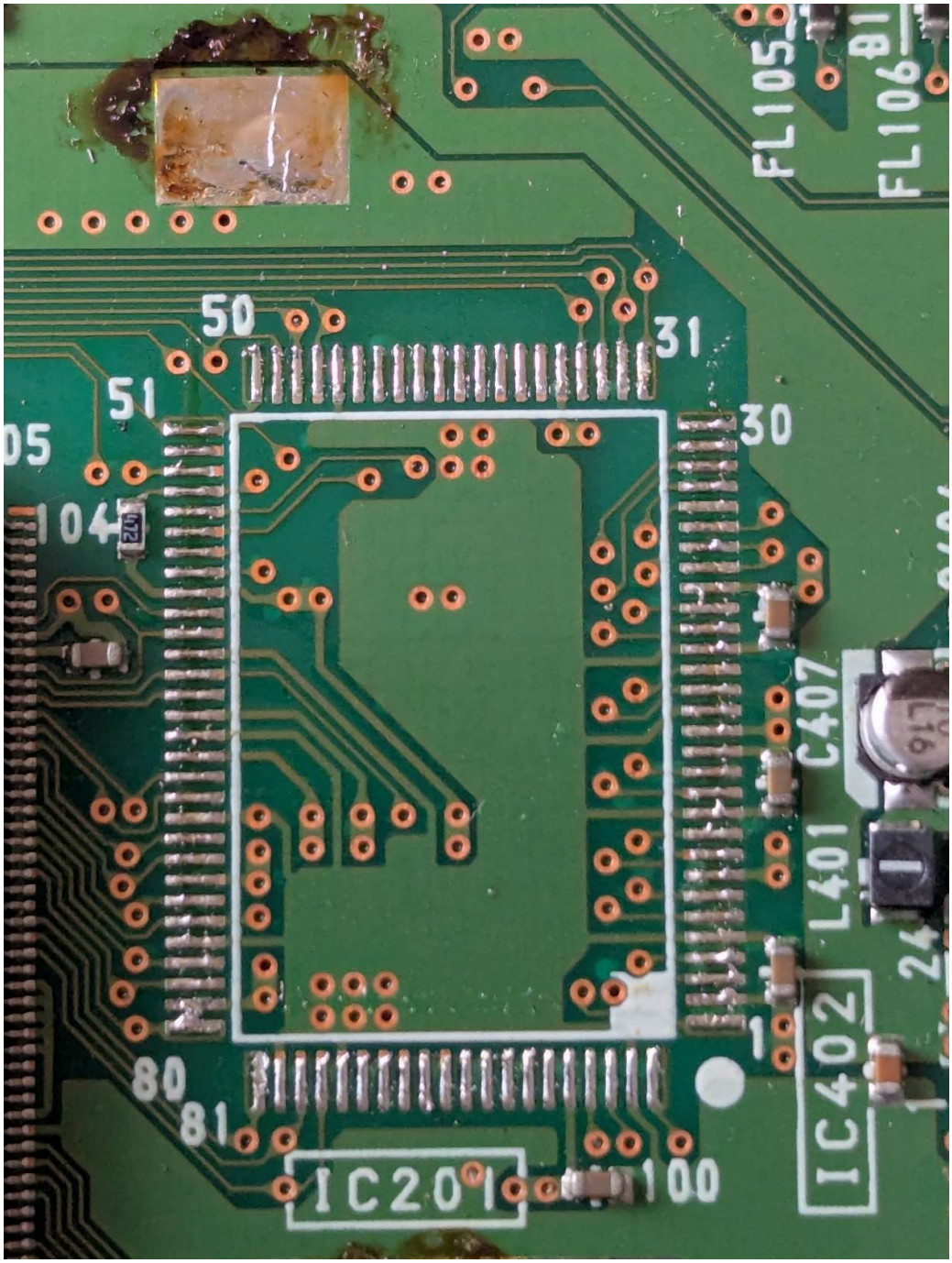
Let’s get started…

Strip the console down, remove the motherboard, desolder the RF shield and proceed to use hot air to remove the VRAM chip, maybe use Kapton tape to protect nearby components.

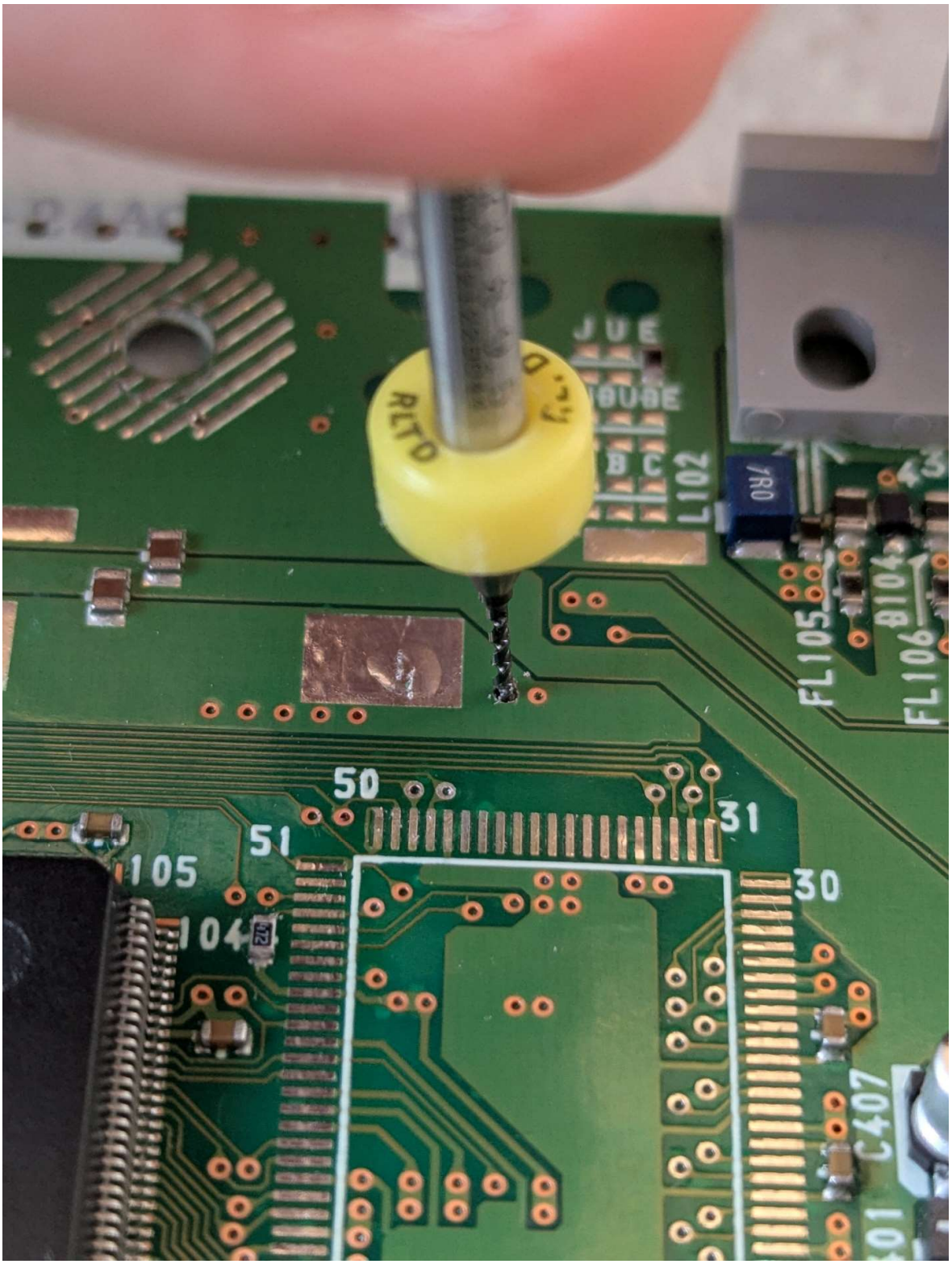
You may also notice I have wrapped the nearby capacitors in some tissue, the tissue is additional shielding from heat to ensure the caps never even reach their max rated temperature.

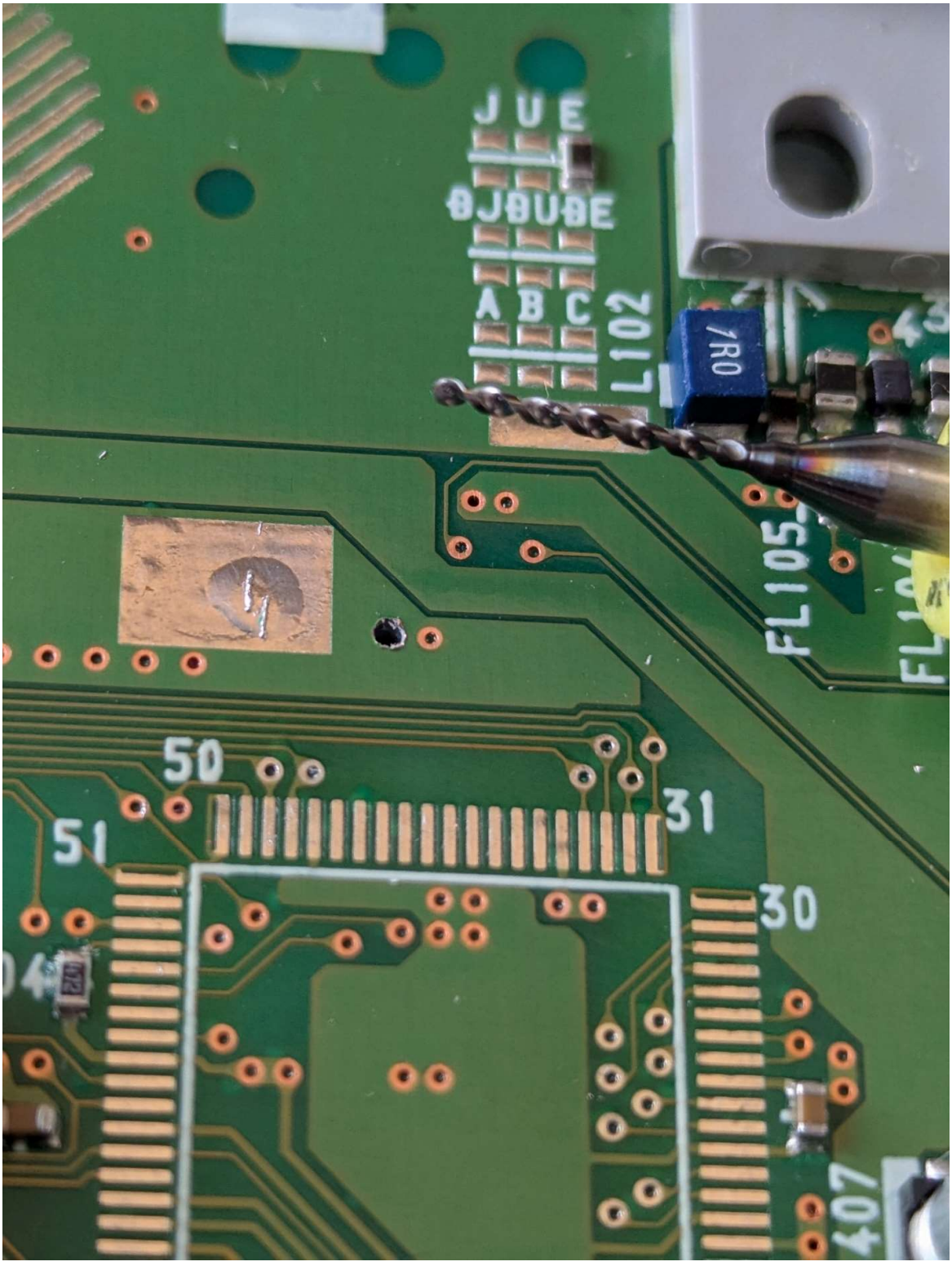
This makes absolutely sure that they are safe. You do not want them to explode in your eyes!

After removal of the VRAM chip you will have residual solder on all of the pads, so use some solder wick/braid to clean those up.

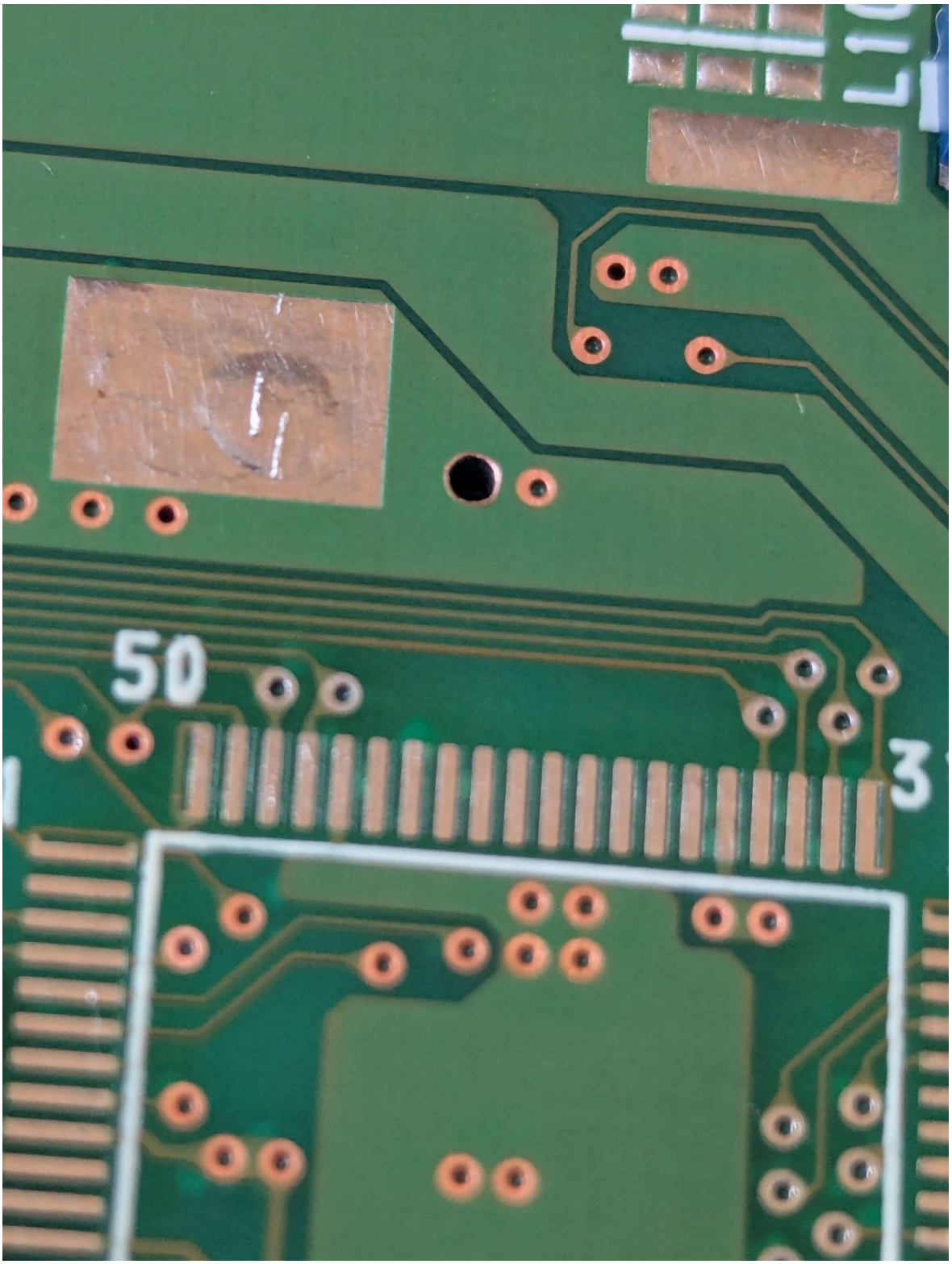


Use the 0.8mm PCB drill bit between your finger and thumb and enlarge this via large enough to pass a wire through, do NOT use a power drill, finger force is enough because these drill bits are so sharp.





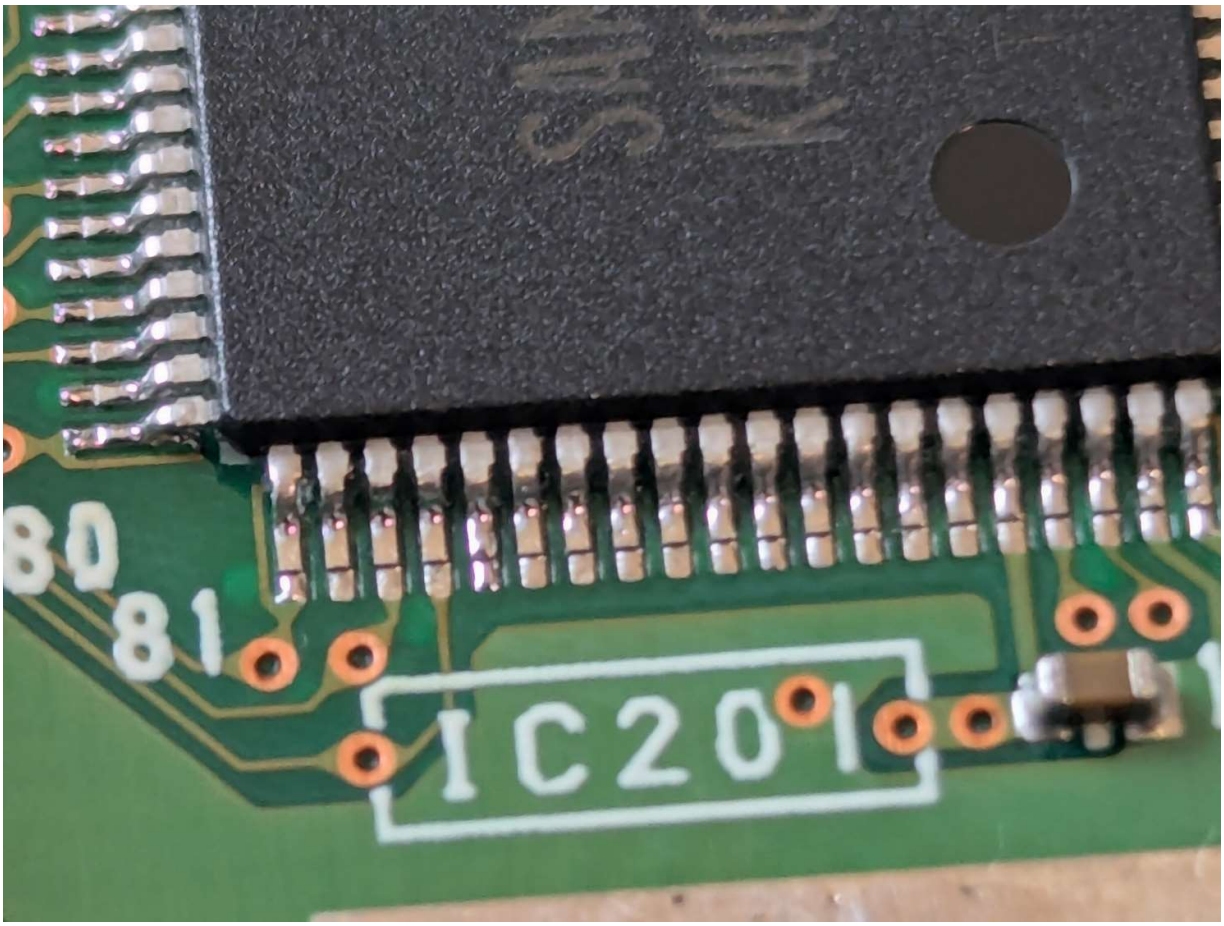
You may have a burr after drilling it out, you can easily remove the burr by using a larger drill bit such as 3mm or 4mm in size and very gently use it to knock off the burr.



Isn’t that nice? :)

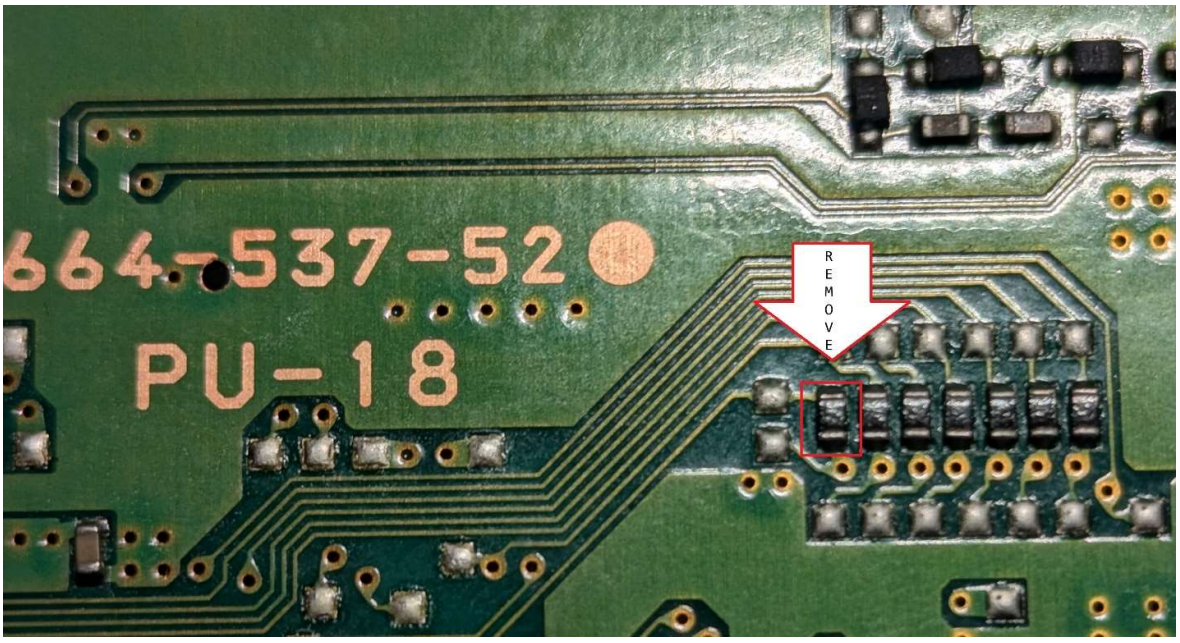
Solder on the new replacement chip, taking note of its orientation, the corner with the circle is pin 1, its not shown in the photo here but on the motherboard is also a marking to show pin 1.

Use great care when installing, use 320*C maximum on a temperature-controlled iron, plenty of flux and work quickly, I destroyed my chip in my first attempt due to moving the iron too slowly and having the heat kill one of these very sensitive chips.

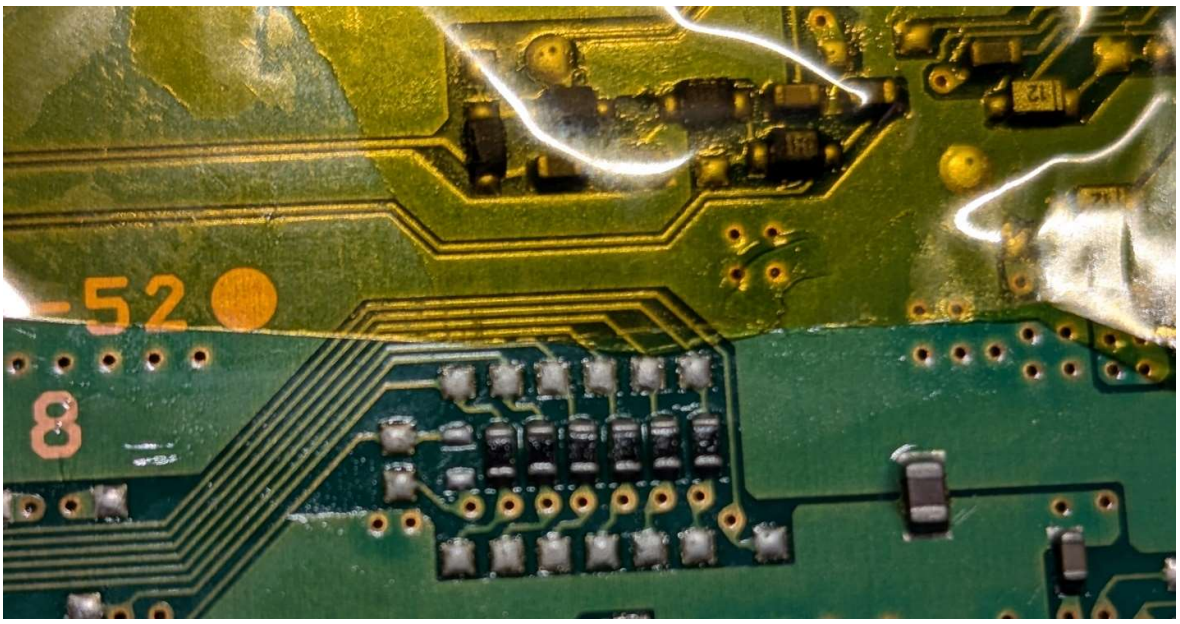


Now your new chip is beautifully installed in its final resting place, flip over the motherboard to start wiring it up so the PS1 can actually address the extra VRAM space.

Remove this 22 ohm resistor marked here…

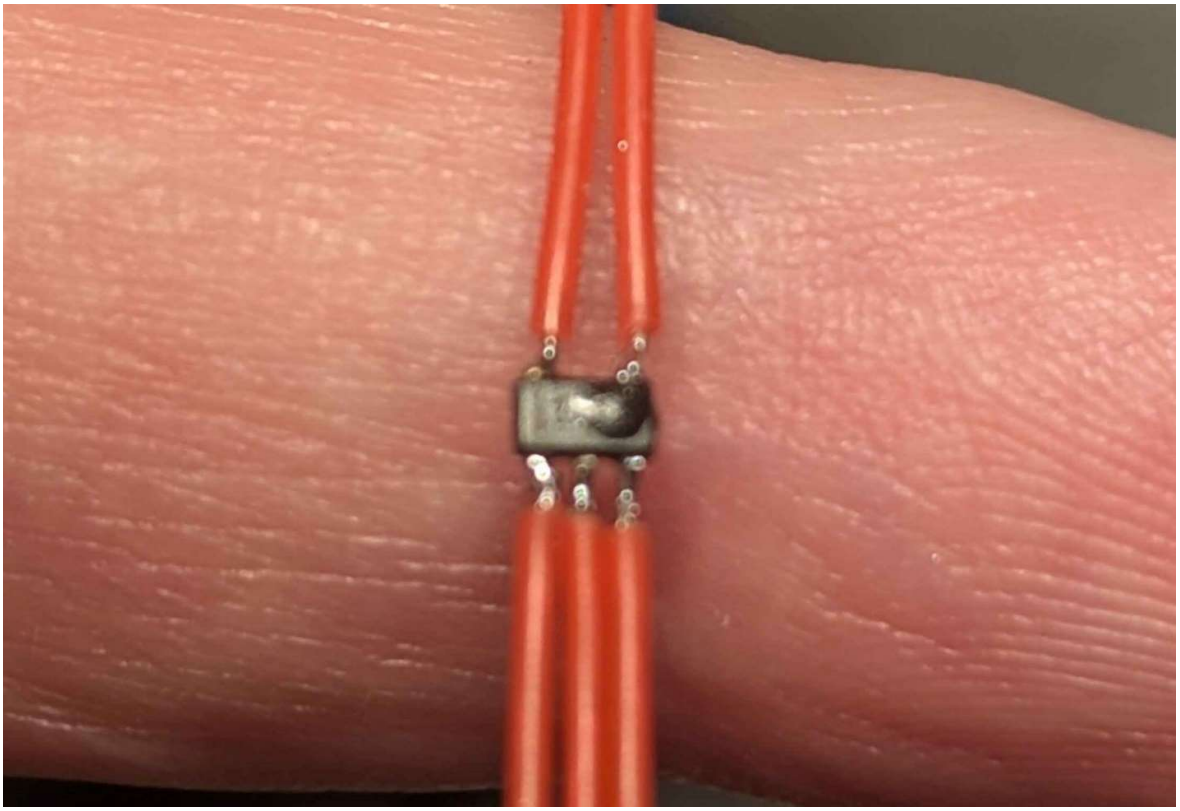


Here it is seen below after removal:

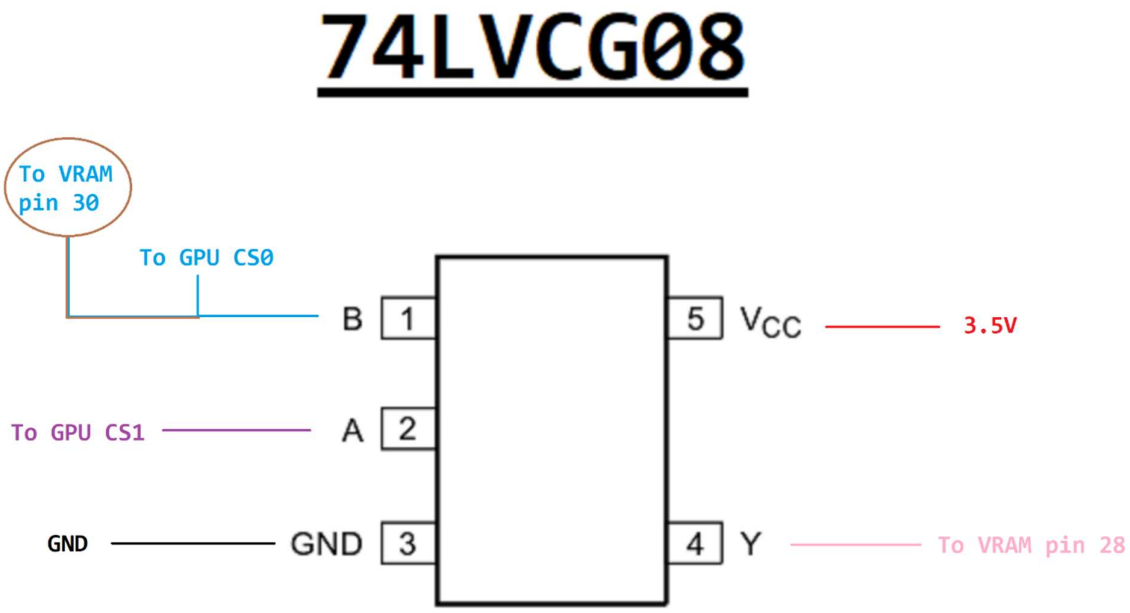


Once you have removed said resistor above, you will have all wiring points exposed that will need hooking up in the new configuration.

Attach a wire to each leg of the logic gate ready for wiring it up.



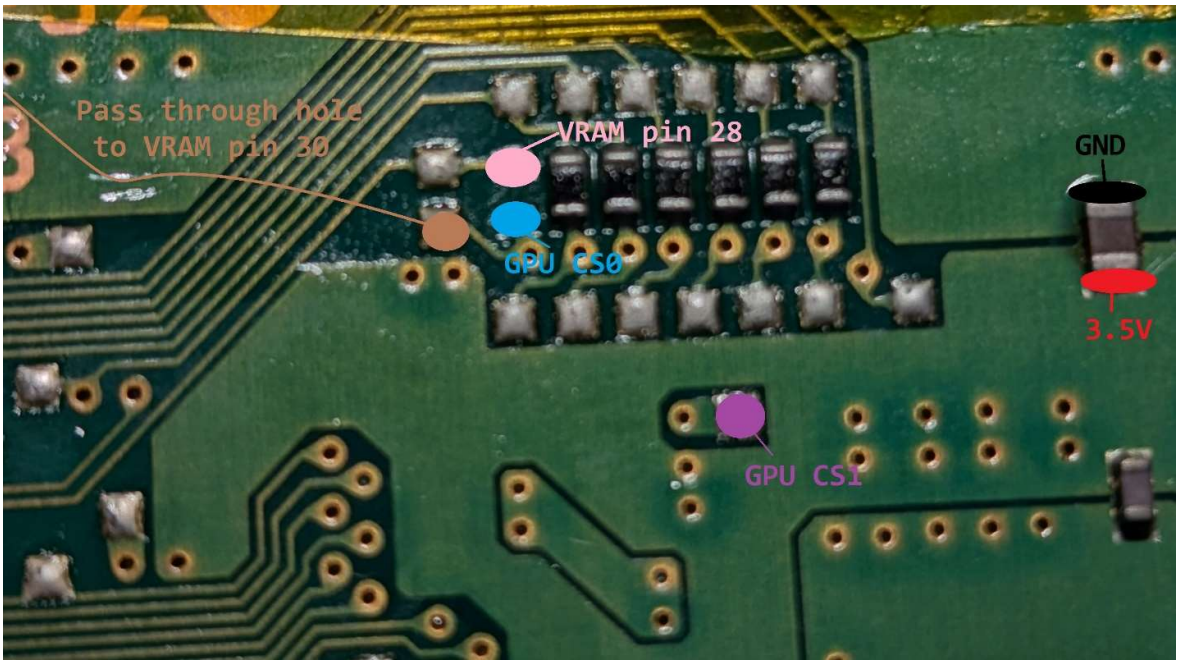
Here is a diagram to show how to wire up the logic gate:



The diagram above is correct when looking down at the logic gate, with the part number text facing you.

The blue and brown marked points are already connected via traces on the motherboard, so you can use singular wires on each leg of the logic gate on this model.

And here is a marked photo to show where to connect each connection on the PU-18 revision motherboard:



As shown in the diagram, the brown connection point must be passed through the hole drilled earlier and anchored to pin 30 of the VRAM chip like this:

That’s it! If you followed correctly your PS1 can now address 2MB of VRAM!

SO HOW DOES IT WORK??

All PS1 consoles only have enough address lines to address 1MB chips.

However, the GPU is equipped to address 2 of those said chips. Some PS1 arcade hardware uses the same GPU and is fitted with 2 of them!

It was actually an unconventional idea that I had, involving repurposing the GPU's chip select signal.

Following these instructions, you are using a logic gate to correctly control the VRAM chip CE connection, the logic gate allows the new chip to disable itself when the GPU calls for all VRAM to be disabled (an example of this is for a fraction of a second at power on time) and connecting the VRAM chips final address line to the GPU's chip select line.

Effectively the PS1 now works as though it has 2x virtual stock sized chips, just like some arcade boards have physically, when it attempts to access the 'first' chip its accessing one half of the new VRAM chip and when the GPU attempts access of the 'second' chip its now accessing the other half.

Enjoy!